भारतीय मानक
Indian Standard

IS 17641 : 2021
Superseding IS 5807 (Part 6) : 1978

संघात के प्रति सतही फिनिश की प्रतिरोध का आकलन — परीक्षण की विधि

Assessment of Surface Finish Resistance to Impact — Method of Test

ICS 97.140

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December 2021 **Price Group 4**

Furniture Sectional Committee, CED 35

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Furniture Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was originally published in 1978 as IS 5807 (Part 6) : 1978 'Method of test for clear finishes for wooden furniture Part 4 Resistance to mechanical damage'. Initially the Indian Standard covered the test method designed to test the clear finishes for wooden furniture which will invariably suffer from mechanical knocks and scrapes. In view in the diversification in the use different materials and finishing systems in the furniture industry, this standard has been brought out and supersedes IS 5807 (Part 6) : 1978. In this version, the test method has been given for the assessment of the surface resistance to impact of all rigid furniture surfaces of furniture.

The tests are generally carried out on panels of a size sufficient to meet the requirements of the test and of the same material as, and finished identically to, the finished furniture.

The method is suitable for use either as a means of comparing different finishing systems or as a quality control test to ensure that a specified performance level is being achieved or maintained.

NOTE — The nature of the substrate will have a major effect on the results obtained in the test.

In the formulation of this standard, considerable assistance has been taken from ISO 4211-4 : 1988, 'Furniture — Tests for surfaces — Part 4: Assessment of resistance to impact'.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960. 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ASSESSMENT OF SURFACE FINISH RESISTANCE TO IMPACT — METHOD OF TEST

1 SCOPE

This standard covers a method of assessment of resistance to impact of all rigid surfaces of finished furniture.

2 REFERENCES

The following Indian standard contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

IS No.	*Title*
2898 (Part 1) : 2019	Rolling bearings — Balls: Part 1 Steel balls (*second revision*)

3 PRINCIPLE

A cylindrical steel weight is dropped from specified heights through a vertically-mounted guide onto a steel ball of specified diameter and hardness positioned on the test panel. The degree of damage to the test area is assessed by reference to a descriptive numerical rating code.

4 APPARATUS AND MATERIALS

4.1 Cylindrical Steel Weight — *See* B in Fig. 1, with a mass of (500 ± 5) g and a diameter that is approximately 1 mm less than the inside diameter of the guide tube. This weight shall be made of softer alloy than the ball, so that it will not make indentations on the ball. Provision shall be made for the weight to be raised and lowered.

4.2 Horizontal Base — Provides rigid support for the test panel. When the test area forms part of a piece of furniture, the complete item should stand on a rigid floor.

4.3 Magnifier — With a magnification of at least ×7 fitted with a graticule scale which permits measurements to be taken to an accuracy of at least 0.1 mm.

4.4 Steel Ball — *See* C in Fig. 1, with a diameter of 14 mm and Rockwell hardness of 60 to 66 HRC, a rolling bearing ball for example [*see* IS 2898 (Part 1)].

4.5 Vertically-mounted Guide Tube — Inside diameter of (40 ± 5) mm (*see* A in Fig. 1). A 10 mm ± 0.5 mm thick disc with a centre hole of diameter 14 mm for the ball (*see* **4.4**) shall be attached to the bottom end of the guide tube.

5 TEST PANEL

The test panel shall be substantially flat, preferably not less than 120 mm x 140 mm. It shall be prepared by the same procedure as adopted in making the commercial product. It shall be allowed to age at a temperature of not less than 15 °C with free access to air for a minimum of 28 days. Conditioning should begin at least 7 days before testing and should be carried out in air at a temperature of 27 ± 2 °C and a relative humidity of (65 ± 5) percent.

6 PROCEDURE

6.1 General

No impact point shall be less than 20 mm from any edge of the test panel. The centres of impact points shall not be less than 20 mm apart. If the grid pattern method detailed in **6.2** is to be used, then six lines spaced at least 20 mm apart shall be marked out on the surface that is to be tested. If the surface material is anisotropic, the lines shall be perpendicular to the grain (or equivalent). Five impact points spaced at least 20 mm apart shall be marked off along each line (*see* Fig. 2).

The test panel shall be placed in a stable position on the horizontal base (*see* **4.2**) in such a way that all impact points are inside the area covered by the base.

When the horizontal surfaces of finished furniture or parts of furniture are being tested, they shall be aged and conditioned as in **5**, and the unit being tested shall be supported on a rigid floor. On finished furniture, the impact shall be on the most rigid part of the furniture.

The tests should be carried out at an ambient temperature of (27 ± 2) °C, and at a relative humidity of (65 ± 5) percent.

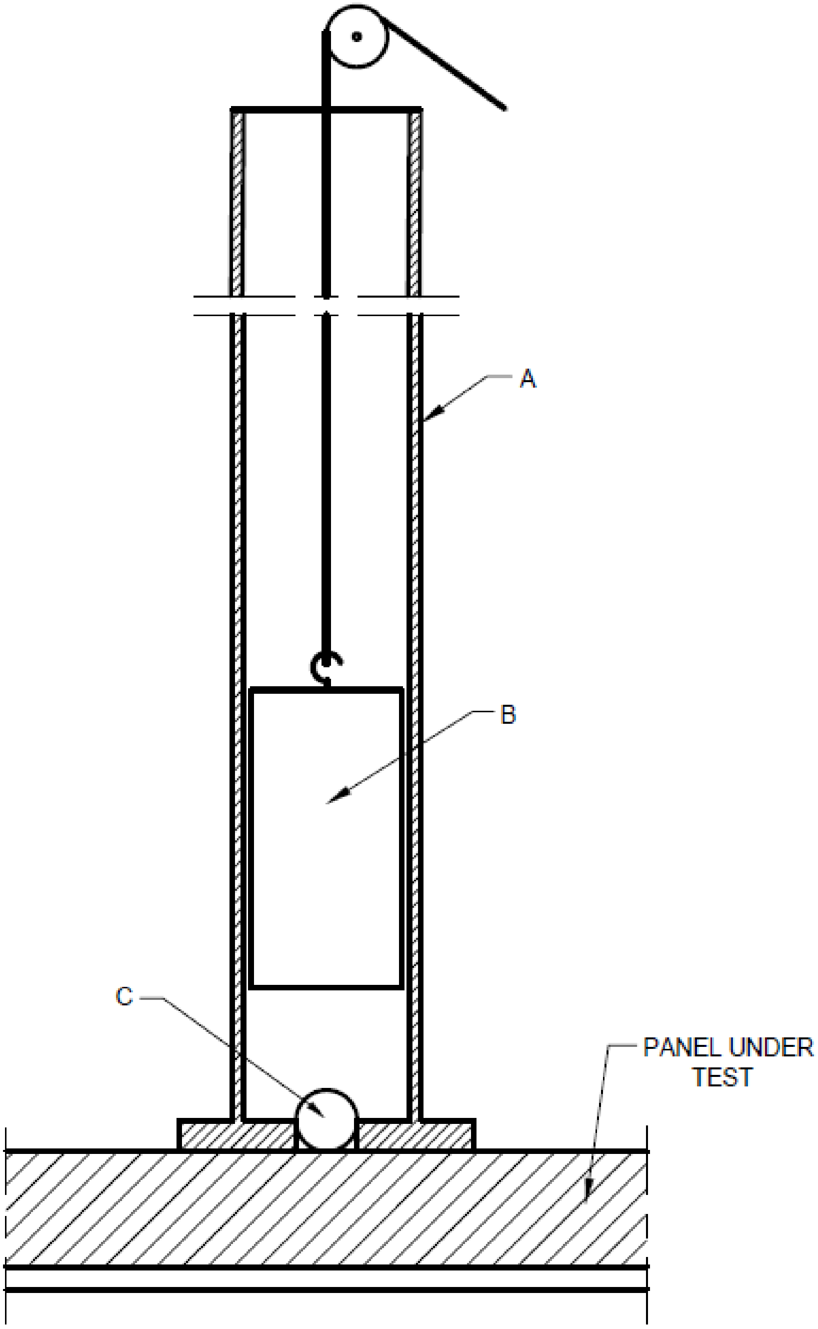
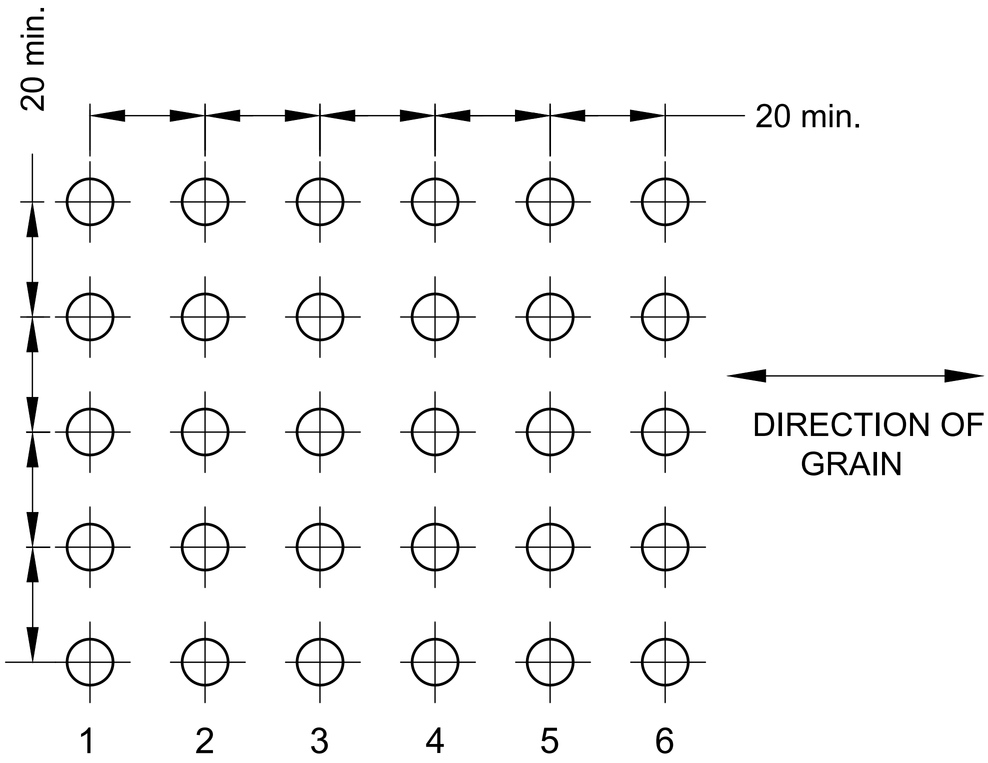


Fig. 1 Impact on Surface



All dimensions in millimetres

FIG. 2 IMPACT POINTS ON SURFACE

6.2 Test

Make five tests from each of the following dropping heights: 10 mm, 25 mm, 50 mm, 100 mm, 200 mm and 400 mm. The dropping height, which shall be measured within ± 0.5 mm, is the distance from the top of the ball to the bottom surface of the weight.

Either make a random selection of test sites, making provision to identify the dropping height for each site adequately, or preferably use the grid pattern described in **6.1** making five tests on each numbered line with dropping heights as follows:

a) On line 1 from a dropping height of 10 mm;
b) On line 2 from a dropping height of 25 mm;
c) On line 3 from a dropping height of 50 mm;
d) On line 4 from a dropping height of 100 mm;
e) On line 5 from a dropping height of 200 mm; and
f) On line 6 from a dropping height of 400 mm.

For each test, position the guide tube (*see* **4.5**) on the test area with the ball (*see* **4.4**) in direct contact with the surface. Drop the cylindrical weight (*see* **4.1**) once from the specified height onto the ball.

NOTES

1 After each test, the ball should be examined for possible deformation and if necessary replaced by an undamaged ball.

2 After completion of the tests, the application of penetrating stain or other suitable material to the test area may assist with the identification of surface cracks.

6.3 Examination of Test Panel

Carefully examine the test area under magnification and good direct light using the following procedure.

Keeping the test area directly under the light, rock the panel or the light, so that the angle between the direction of the light and the plane of the panel varies between 0° and 30°. During the rocking movement, examine the test area using the magnifier (*see* **4.3**).

Turn the test face of the panel through 90° and repeat the procedure.

7 ASSESSMENT OF RESULTS

7.1 Rating

Rate the test areas according to the descriptive numerical rating code in the Table 1 (*see* also Fig. 3).

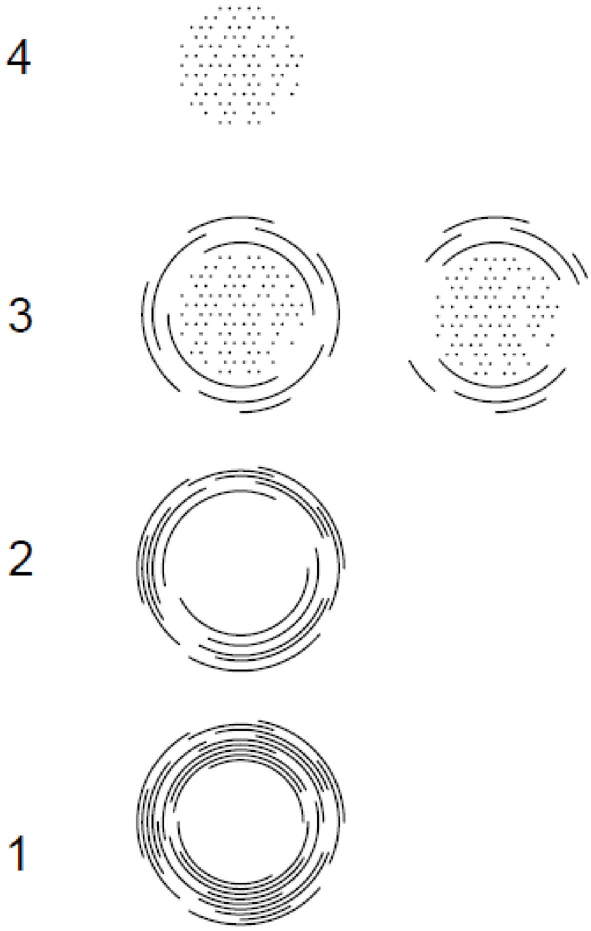


FIG. 3 VISIBLE CHANGES

Table 1 Descriptive Numerical Rating Code

(*Clause* 7.1)

Rating	Description
5	No visible changes (no damage).
4	No cracks in the surface but the impact mark is visible when light from the source is reflected from the surface at or very near the test point, and the reflected light strikes the observer's eye
3	Slight cracking at the surface, usually one or two circular cracks within the impact mark.1)
2	Moderate to heavy cracking limited to the impact mark.2)
1	Cracks which extend outside the impact mark and/or flaking of the surface finish.

1) The cracks need not form full circles; they can form circle arcs. These arcs usually form across the grain. In such cases, damage is estimated on the basis of the number of cracks or circle arcs inside the impact mark.

2) A certain amount of care should be taken when deciding whether cracks lie inside or outside the impact mark, since its boundaries are often obscure. *See* Note 2 in **6.2**.

Calculate the rating to be reported as the nearest whole number to the mean of 5 individual ratings, for example:

a) Individual ratings : 2, 2, 3, 3, 3
   Reported rating : 3
b) Individual ratings : 2, 2, 2, 3, 3
   Reported rating : 2

The average rating shall be calculated and reported for each dropping height used.

NOTE — It is recommended that each test area be rated by more than one observer experienced in this type of assessment.

7.2 Diameter of Impact Mark

Measure the largest diameter of the impact mark at each of the test areas using the magnifier (*see* **4.3**) (*see* Fig.4).

The average impact mark diameter for all five test areas shall be calculated and reported for each dropping height used.

NOTE — If the impact mark cannot be observed directly using the magnifier, the boundaries of the mark are ascertained when illuminated as set forth for rating 4 in the table, using the magnifier.

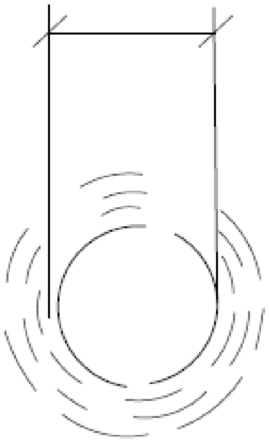


FIG. 4 IMPACT MARK DIAMETER

8 TEST REPORT

The test report shall include at least the following information:

a) A reference to this Indian Standard;

b) Relevant data of the unit or panel tested (wherever possible, the substrate and the finishing system should be identified);

c) The dropping height for each test area;

d) The reported rating of each test according to **7.1**;

e) The reported diameter of each test according to **7.2**;

f) The result of the test in terms of the stated requirements, if any;

g) Any deviations from this Indian standard; and

h) The date of test.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Furniture Sectional Committee, CED 35

Organization	*Representative(s)*
In Personal Capacity (*II A, K-11, Ground Floor, Kailash Colony, New Delhi 110048*)	Shri Balbir Verma (***Chairman***)
Association of Furniture Manufacturers and Traders (I), Mumbai	Representative
Blowplast (BP) Ergonomics Ltd, Mumbai	Dr Nitin Sudame Dr Gita Pirama l(*Alternate*)
Central Public Works Department, New Delhi	Shri A. K. Sharma Shrimati Nandni Mukopadhyay (*Alternate*)
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Directorate of Education Govt of NCT of Delhi, Delhi	Representative
Forest Research Institute, Dehradun	Dr Sadhna Tripathi Dr Kishan Kumar (*Alternate*)
Godrej & Boyce Mfg Co Ltd, Mumbai	Shri Ega Venkateshwarlu Shri Nirav Shah (*Alternate* I) Shri Lalitesh Mandrekar (*Alternate* II)
Government e-Marketplace, New Delhi	Representative
Indian Furniture Products Ltd (Zuari), Tiruvallur	Shri C. M. Satheesh Kumar Shri S. Saravanan (*Alternate*)
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The Indian Institute of Architects, Mumbai	Ar Vikramray Pramodray Pandya

Organization	*Representative(s)*
The Supreme Industries Limited, New Delhi	SHRI SANJEEV JAIN SHRI MUKESH KAUL (*Alternate* I) SHRI SANJAY DOGRA (*Alternate* II)
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BIS Directorate General	SHRI SANJAY PANT, SCIENTIST 'F' AND HEAD (CIVIL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

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Amendments Issued Since Publication

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